

CLAIMS:

5        1.        A color filter for coloring a first light ray having a unidirectional optical path and a second light ray having a bidirectional optical path for each pixel, comprising:

a first coloring portion for coloring the first light ray and a second coloring portion for coloring the second light ray, the first coloring portion having a greater thickness than the second coloring portion, the first coloring portion being formed in subsidence with respect to the second coloring portion with a principal plane of the first coloring portion being different in height from a principal plane of the second coloring portion by a predetermined value.

10      2.        A color filter as defined in Claim 1, characterized in that the predetermined value is a value required to substantially equalize or mutually optimize a first optical effect and a second optical effect, the first optical effect being to be exerted on the first light ray by a portion of a liquid crystal layer corresponding to the first coloring portion, and the second optical effect being to be exerted on the second light ray by a portion of the liquid crystal layer corresponding to the second coloring portion when the liquid crystal layer is used in a liquid crystal display panel to which the color filter is applied.

20      3.        A color filter as defined in Claim 2, characterized in that the optical effect is an effect of causing retardation.

25      4.        A color filter as defined in Claim 1, 2 or 3, characterized in that the first and second coloring portions have their respective thicknesses such that the first coloring portion provides a greater coloring effect than the second coloring portion when a light ray of the same optical path and the same property is transmitted through the first and second coloring portions.

30      5.        A color filter as defined in Claim 4, characterized in that the first coloring portion has a thickness substantially twice as great as the second coloring portion.

35      6.        A color filter as defined in any one of Claims 1-5, characterized in that the color filter further comprises a step-forming layer of an optical transmissive material, which supports the second coloring portion for providing the first and second coloring portions with thicknesses different from each other by the predetermined value.

7. A color filter as defined in Claim 6, characterized in that the step-forming layer is colorless and transparent.

5 8. A color filter as defined in any one of Claims 1-7, characterized in that the step-forming layer includes an optically transmissive base material and multiple particles of optically transmissive material having a refractive index different from a refractive index of the base material and being scatteringly mixed into the base material.

10 9. A liquid crystal display device using a color filter for coloring a first light ray having a unidirectional optical path and a second light ray having a bi-directional optical path for each pixel, the color filter comprising:

15 a first coloring portion for coloring the first light ray and a second coloring portion for coloring the second light ray, the first coloring portion having a greater thickness than the second coloring portion, the first coloring portion being formed in subsidence with respect to the second coloring portion with a principal plane of the first coloring portion being different in height from a principal plane of the second coloring portion by a predetermined value.

10. A liquid crystal display device according to in Claim 9, characterized in that:

20 the color filter is provided on a substrate at a display face side of the liquid crystal display device;

the opposite substrate is provided with a pixel electrode comprising a transmissive electrode part for causing the first light ray to be transmitted therethrough and a reflective electrode part for causing the second light ray to be reflected therefrom; and

25 an area of the first coloring portion is aligned with an area of the transmissive electrode part, and an area of the second coloring portion is aligned with an area of the reflective electrode part.

11. A liquid crystal display device according to in Claim 10, characterized in that the transmissive electrode part and the reflective electrode part have principal surfaces of substantially 30 the same height.

12. A liquid crystal display device according to in Claim 10, characterized in that there is a difference of height between principal surfaces of the transmissive electrode part and reflective electrode part, and a sum value of this difference of height and the predetermined value is a value 35 required to substantially equalize a first optical effect and a second optical effect, the first optical

effect being to be exerted on the first light ray by a portion of a liquid crystal layer corresponding to the transmissive electrode part, and the second optical effect being to be exerted on the second light ray by a portion of the liquid crystal layer corresponding to the reflective electrode part when the liquid crystal layer is used in a liquid crystal display device to which the color filter is applied.

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13. A method of manufacturing a color filter for coloring a first light ray having a unidirectional optical path and a second light ray having a bi-directional optical path for each pixel, comprising the steps of:

depositing an optically transmissive material on a base layer;

10 patterning the deposited layer of optically transmissive material to form a step forming layer wherein at least one recess-shaped portion is formed for a pixel, the recess-shaped portion having a bottom face of a predetermined shape corresponding to an area wherein the first light ray is caused to be transmitted and a wall face of a predetermined height; and

15 depositing a material for coloring the first and second light rays on the step forming layer and the recess-shaped portion so as to form a first coloring portion for coloring the first light ray and a second coloring portion for coloring the second light ray, the first coloring portion having a greater thickness than the second coloring portion, the first coloring portion being formed in subsidence with a principal surface of the first coloring portion being different in height from a principal surface of the second coloring portion by a predetermined value.

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14. A method of manufacturing a liquid crystal display device, comprising the steps included in a method as defined in Claim 13, wherein

25 the color filter is provided to one substrate of the liquid crystal display device and the other, opposed substrate is provided with a pixel electrode comprising a transmissive electrode part for making the first light ray to be transmitted therethrough and a reflective electrode part for making the second light ray to be reflected therefrom,

the display device manufacturing method further comprising the step of aligning the first coloring portion with the transmissive electrode part and aligning the second coloring portion with the reflective electrode part.

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15. A method as defined in Claim 14, further comprising a pixel electrode forming step of forming the transmissive and reflective electrode parts in substantially the same heights.